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Faculty of Engineering
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Fall 2009 Final Exam
Linear System (EE 311)
Date: 20/1/2010 Time: 3 hrs
(Open Book Exam)

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Answer all questions:

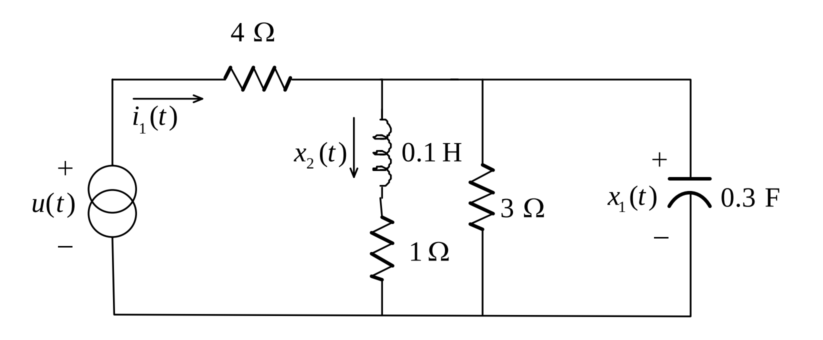
Q1 - Evaluate the inverse of the given *z*-transform $H(z) = \dfrac{z^2 + 2z}{\left(z - \frac{1}{4}\right)\left(z + \frac{1}{6}\right)^2}$ [10]

for the following cases:

(a) ROC $|z| > 1/3$ (b) ROC $1/6 < |z| < 1/4$

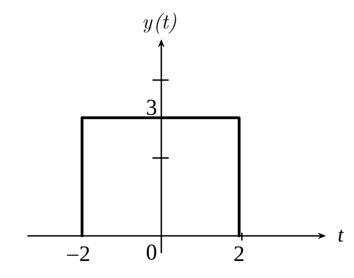
(c) ROC $|z| > 4$ (d) ROC $|z| < 1/8$

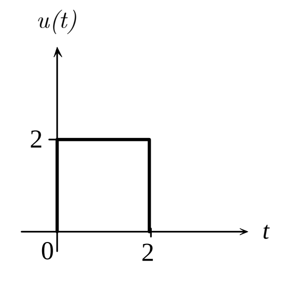
Q2 - Write a state - variable description for the circuit shown below, find the impulse response, then verify if the system is stable or not. [10]



Q3 – When the input to a continues-time system $\delta(t)$ the output is the shown $y(t)$, find the output of the same system to the given input signal $u(t)$ for [10]

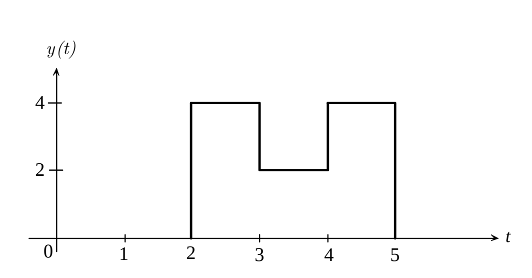
(a)

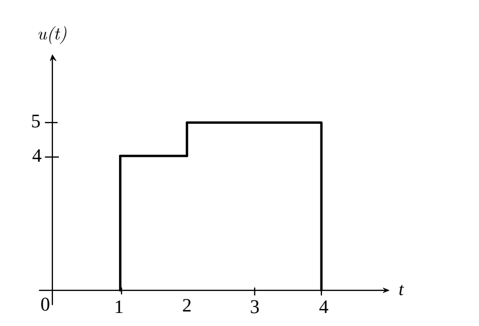




[5]

(b)

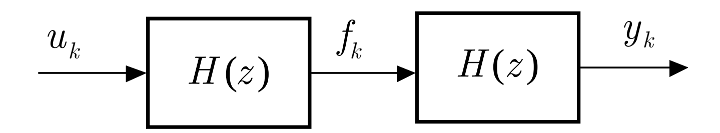




[5]

Q4 - Two identical systems with the transfer function $\{h_k\} = (1/5)^k, \quad k \geq 0$. The two systems are cascaded as shown. If the sequence f_k has the Z- transform

$$F(z) = \frac{z^3 + z^2}{\left(z - \frac{1}{2}\right)\left(z - \frac{1}{3}\right)^2}$$



(a) Find the sequences u_k. [5]

(b) Find the sequences y_k . [5]